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UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES

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*Ex parte* BRADFORD A. RITTER and ROSS CUNNIFF

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Appeal 2009-001306  
Application 10/630,452  
Technology Center 2600

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Decided: August 31, 2009

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Before KENNETH W. HAIRSTON, JOHN A. JEFFERY,  
and CARL W. WHITEHEAD, JR., *Administrative Patent Judges.*

WHITEHEAD, JR., *Administrative Patent Judge.*

DECISION ON APPEAL

Appellants appeal under 35 U.S.C. § 134(a) from the Examiner's rejection of claims 1-16. *See* App. Br. 2. We have jurisdiction under 35 U.S.C. § 6(b) (2002). We reverse.

### STATEMENT OF THE CASE

Appellants invented a texture mapping system that recognizes how different texels of texture respond differently to a light from a light source.<sup>1</sup>

Claim 1 which further illustrates the invention follows:

1. A texture mapping system, comprising:

memory for storing a parametric texture map, the parametric texture map having a plurality of texels defining a first texture, at least one of the texels defining a variable expression that defines a luminosity parameter as a function of light direction; and

a texture map manager configured to perform a rotation of the first texture thereby providing a parametric texture map defining a second texture that is rotated relative to the first texture, the texture map manager further configured to define a variable expression for a texel of the parametric texture map defining the second texture by adjusting the variable expression of the one texel to compensate for a change in relative light direction resulting from the rotation.

### *The Rejections*

The Examiner relies upon the following prior art reference as evidence of unpatentability:

Watanabe

US 6,384,834 B1

May 7, 2002

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<sup>1</sup> *See generally* App. Br. 3-5; Spec. 6-8.

Tom Malzbender et al., Polynomial Texture Maps (Hewlett-Packard Laboratories 2001), *available at* <http://www.hpl.hp.com/research/ptm/papers/ptm.pdf> [hereinafter “Malzbender”].

Claims 1-16 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Watanabe and Malzbender (Ans. 3-7).

Rather than repeat the arguments of Appellants or the Examiner, we refer to the Brief and the Answer for their respective details. In this decision, we have considered only those arguments actually made by Appellants. Arguments which Appellants could have made but did not make in the Briefs have not been considered and are deemed to be waived. *See* 37 C.F.R. § 41.37(c)(1)(vii) (2008).

#### *Obviousness rejection*

Appellants argue that Malzbender does not disclose defining *a variable expression for a texel by adjusting the texel’s variable expression to compensate for a change in relative light direction resulting from the rotation* as indicated in claim 1 (App. Br. 7). The Examiner disagrees with Appellants’ assessment and argues that Malzbender teaches the limitations in the form of equations (Ans. 10).

#### ISSUE

Have Appellants shown that the Examiner erred in finding that the combination of Watanabe and Malzbender discloses a texture mapping system that performs rotational evaluation of textures and adjusts texel variable expressions based upon the results of the evaluation?

## FINDINGS OF FACT

### *Malzbender*

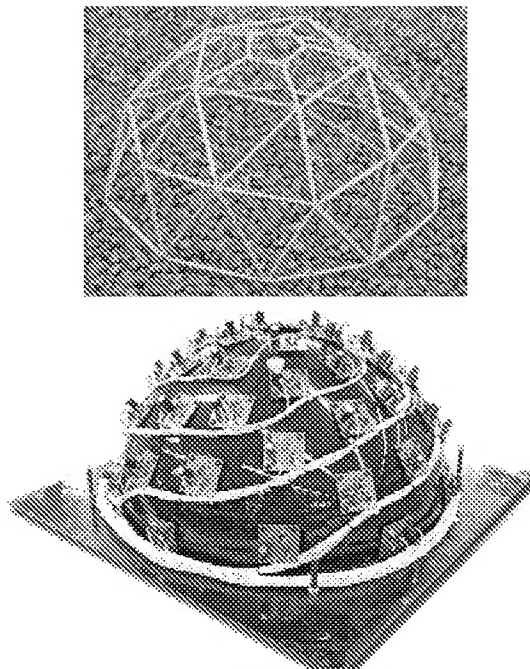
1. Malzbender (§ 3.2) discloses an equation that computes an unscaled color per texel ( $R_n(u,v), G_n(u,v), B_n(u,v)$ ) that is modulated by a luminance model  $L(u,v)$ :

$$R(u,v) = L(u,v)R_n(u,v);$$

$$G(u,v) = L(u,v)G_n(u,v);$$

$$B(u,v) = L(u,v)B_n(u,v);$$

2. Malzbender discloses a method that is an image-based technique that requires no modeling of complex geometry or bump maps (§ 1).
3. Figure 2 of Malzbender is reproduced below:



The first device for collecting a photographic acquisition of polynomial texture maps (PTM) is a subdivided icosahedral template that assists in positioning a light source in 40 positions relative to a sample. The second device provides fully automated acquisition of 50 source images

wherein each is illuminated with individual strobe light sources (Section 3.1).

4. The camera is mounted in both PTM collecting devices in the apex of the domes with the samples placed upon the floor. This configuration achieves multiple registered images with varying light source directions (§ 3.1).

### *Specification*

5. The image capture unit 58 comprises a dome structure 72 with a hole wherein the camera's lens is positioned through it so that it can receive the light from the interior of the dome structure 72. A sample object 86 is positioned underneath the dome structure in direct view of the camera's lens (¶¶ [0036-37]).

6. A plurality of printed circuit boards 92, each having their own light source and light activation logic, are mounted on the dome structure 72 such that the light from each of the light sources 95 illuminates a sample 86 (¶ [0038]).

7. The location of each light source 95 may be fixed and, for each texture image, the text map manager 32 is aware of the angle of incidence of the light that is illuminating the sample object 86. The angle of incidence of light from each source 95 on the sample object 86 can be measured and programmed into the texture map manager 32 (¶ [0041]).

8. The camera 76 and the sample object 86 remain in a fixed position as the texture images are being captured (¶ [0043]).

## PRINCIPLES OF LAW

In rejecting claims under 35 U.S.C. § 103, it is incumbent upon the Examiner to establish a factual basis to support the legal conclusion of

obviousness. *See In re Fine*, 837 F.2d 1071, 1073 (Fed. Cir. 1988). In so doing, the Examiner must make the factual determinations set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 17 (1966) (stating that 35 U.S.C. § 103 leads to three basic factual inquiries: the scope and content of the prior art, the differences between the prior art and the claims at issue, and the level of ordinary skill in the art). If the Examiner's burden is met, the burden then shifts to Appellants to overcome the prima facie case with argument and/or evidence. Obviousness is then determined on the basis of the evidence as a whole and the relative persuasiveness of the arguments. *See In re Oetiker*, 977 F.2d 1443, 1445 (Fed. Cir. 1992).

## ANALYSIS

As we stated previously, the Examiner relies upon the equations of Malzbender to disclose *adjusting* the texel's variable expression *to compensate for a change in relative light direction resulting from the rotation* (Ans. 10-11). The Examiner uses Malzbender's equations to define a first texture ( $l_{u1}, l_{v1}$ ) wherein ( $l_u, l_v$ ) are used to define the components of the light vector (Ans. 10-11). *See also* FF 1. The first texture (Ans. 10) is defined as:

$$R(u, v) = L(u, v; l_{u1}, l_{v1}) Ru(u, v),$$

$$G(u, v) = L(u, v; l_{u1}, l_{v1}) Gu(u, v),$$

$$B(u, v) = L(u, v; l_{u1}, l_{v1}) Bu(u, v),$$

The Examiner then substitutes ( $l_{u2}, l_{v2}$ ) into the equation to define a second texture when the texture is rotated in regard to the first texture (Ans. 11). *See also* FF 1. The second texture (Ans. 11) is defined as:

$$R(u,v) = L(u,v;l_{u2}, l_{v2}) Ru(u,v),$$

$$G(u,v) = L(u,v;l_{u2}, l_{v2}) Gu(u,v),$$

$$B(u,v) = L(u,v;l_{u2}, l_{v2}) Bu(u,v).$$

Appellants agree with the Examiner that Malzbender describes texture maps having a texel defined by a variable expression that defines a luminosity parameter as a function of light direction. *See App. Br. 7.*

Appellants argue that Malzbender is silent in regards to rotational analysis of textures. *See App. Br. 7.* Malzbender discloses that polynomial texture maps can be formed by light direction parameterization instead of relying upon modeling of complex geometry or bump maps (FF 1, 2). Further, Malzbender discloses that multiple images are acquired by varying light source directions using a static object with a static camera under varying lighting conditions (FF 3, 4). This is the very same technique employed by Appellants to acquire or capture images from a sample (FF 3, 4; *see also* FF 5-8). However, Malzbender does not have a *texture map manager* (*see* § 3.4). Malzbender relies upon a generic VLSI system and a software viewer for interacting with the PTMs directly (*see* § 3.4).

Appellants' invention is similar to Malzbender with the exception of the *texture map manager*. While it is clear that Malzbender analyzes the effects of luminance from multiple directions upon textures, Malzbender, as indicated earlier, is silent in regards to rotational luminance analysis of various textures as claimed by Appellants. Further, the Examiner fails to explain how the second texture is a result of a rotational analysis of the first texture. The Examiner simply states “[w]hen the texture is rotated relative to the first texture to become a second texture, light direction for the second



*texture is changed to ( $l_{u2}$ ,  $l_{v2}$ )*” (Ans. 11 (emphasis added)). “[R]ejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.” *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 418 (quoting *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006)).

The Examiner fails to provide any support from Malzbender for his assertion. As we indicated previously, Malzbender and the claimed invention collect measurements in a similar manner and both express the results by variable expressions; however, it is Appellants’ *texture map manager* that provides a rotational analysis of the measurements that Malzbender does not. We agree with Appellants’ arguments that Malzbender also fails to disclose adjusting the texel’s variable expression to compensate for a change in the relative light direction as a result of the rotation performed by the *texture map manager*.

Appellants argue that Watanabe fails to remedy the deficiencies of Malzbender because Watanabe is silent in regard to the texels having variable expressions and therefore fails to suggest any adjustment to them (App. Br. 9). It is the Examiner’s position that Watanabe was not relied upon to address the deficiencies of Malzbender (Ans. 12). The Examiner states that Watanabe discloses a second texture that is rotated relative to the first texture (Ans. 4). However, Watanabe fails to disclose adjusting the texel’s variable expression to compensate for a change in the relative light direction as a result of the rotation performed by the text map manager. Therefore, the combination of Watanabe and Malzbender fails to establish a *prima facie* case of obviousness for the reasons stated previously.

Independent claims 5, 6, 7, and 11 have similar limitations pertaining to adjusting the variable expression to compensate for a change in the relative light direction resulting from a rotation as stated in claim 1 and therefore we will not sustain the Examiner's obviousness rejection of claims 1-16 for reasons stated previously.

### CONCLUSION

Appellants have shown that the Examiner erred in finding that the combination of Watanabe and Malzbender discloses a texture mapping system that performs rotational evaluation of textures and adjusts texel variable expressions based upon the results of the evaluation.

### ORDER

We will not sustain the Examiner's decision rejecting claims 1-16.

### REVERSED

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